APPENDIX A

RESEARCH PROGRAMS AT SCIENTIFIC MATERIALS CORPORATION

A. **Optical Limiters**

Funding Level $750,000 per year USAF

Objective: Eye safety devices for protection against laser radiation.

Markets

Military:
Ground troop protection
Pilot protection
Sensor protection

Commercial
Laboratory eye ware
Medical protectors
Aircraft operating personnel
Sensor protection

B. **Optical Memories and Signal Processing**

Funding Level $250,000 per year BMDO

Objective: High speed, high capacity memories, plus other telecom products

Markets

Military:
Memory
Routers
Signal Processing

Commercial:
Memory
Multi-frequency routers
Peti-flop computers
High Speed Data Processing

C. **Lasers - Compositional Tuning**

Funding Level $300,000 per year NASA

Objective: to provide materials for space based lasers which will operate t specific wavelength for making atmospheric measurements.
Markets: Remote sensing lasers, both ground and space based

D. **Lasers - S-FAP**

| | | |
|---|---|---|
| Funding Level | $160,000 | USN |

Objective: To develop the capability to grow ytterbium (Yb) doped strontium flourapatite for the LLNL Mercury Laser Projects. This is the proposed laser for the commercial model nuclear fusion project.

Markets: Supply LLNL materials for Mercury Lasers
Commercial sales for high energy laser systems

E. **Lasers - Yb:YAG**

| | | |
|---|---|---|
| Funding Level | ~$25,000 per year | Private |

Objective: Produce ultra pure Yb:YAG approaching 1ppb impurity

Markets: Ultra high power lasers for industrial processing. Could replace $CO_2$ lasers with these very high efficiency units. These are table top machines which replace room size lasers and they run off a wall plug. Primary research work is. being done at Hughes Research Labs, LLNL, Air Force Research Labs and Dahlmer Benz (Germany)

Estimated Market Size: $12M per year in 3 to 5 years.

F. **Optics - Bragg Reflectors**

| | | |
|---|---|---|
| Funding Level: | $60,000 - this year | BMDO |
| | $250,000 - Year 2000/2001 | |

Objective: This is a new project to commercialize bulk striated crystal products to provide high quality, low loss optics. Applications are in lasers and telecommunications.

Markets:
- Narrow band reflectors
- Frequency selectors
- Band pass filters
- High Power Optics

G. **Optics - Non Linear Materials**

| | | |
|---|---|---|
| Funding Level | $70,000, 1999 (pending) | Private |
| | $300,000, Year 2000 | |
| | $600,000, Year 2001 | |

Objective: SM has recently been provided hydrothermal and Bridgeman growth equipment to pursue non-linear crystal growth.

Markets: Non linear crystals are used in optic devices to control the characteristics of the system. Applications are Q-switches, doubler, OPO, OPA's etc.

H. **Optical Refrigeration**

Funding: Pending

Objective: It is possible to generate laser energy and at the same time extract heat from the material. This is an essential requirement for ultra high energy laser systems. This project is expected to receive a very high DOD funding priority in fiscal year 2000.

I. **Optical Thermal Emitters**

Funding - 0 - 1999, $100,000 - Year 2000 NASA

Objective: If one introduces a rare earth doped crystal such as YAG into a gas cooled nuclear reactor, the crystal can and does emit a narrow band radiation which can be captured on a photovoltaic cell to generate electricity. NASA has sponsored work on this system for a power source for space craft. The Navy is also working on a motionless power plant. The project is currently in the data taking phase.

Market: U.S. Government